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CENTRAL FAX CENTER****APR 05 2004****SIMTEK6218****OFFICIAL****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**In re Application of
Kenji, NagaiApp. No.: 09/682642
Filed: October 1, 2001
Conf. No.: 3686
Title: STARTER MOTOR FOR
INTERNAL COMBUSTION
ENGINESExaminer: D. Le
Art Unit: 3686
Commissioner for Patents
P.O. Box 1450
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October 24, 2003


Ernest A. Beutler
Reg. No. 19901

Dear Sir:

APPELLANT'S BRIEF**RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences that would have a bearing on or be affected by the decision in this appeal.

REAL PARTY IN INTEREST

In addition to the inventor, the real party in interest is his assignee, Kabushiki Kaisha Moric, a Japanese corporation.

STATUS OF CLAIMS

Claims 1, 10-19, and 23-30 are before the Board on Appeal. Remaining claims 2-9 and 20-22 are held non-elected on the basis of a rather dubious "restriction" or "election" basis which is not before the Board. A clean copy of the claims on appeal appears in the Appendix to this brief.

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STATUS OF AMENDMENTS

As noted above, the case is not under a final rejection, but has had three office actions, the more recent of which are two rejections on the merits, and since no progress was being made, appellant has chosen, as he is permitted, to proceed on the appeal of a twice rejected case. Therefore no amendment was filed subsequent to the rejection under appeal.

APPELLANT'S INVENTION

Appellant's invention relates to an electric motor that is used as a starter motor for internal combustion engines. As is noted in the Background portion of appellant's specification, in a conventional type of starter motor the rotor shaft of the motor extends through one of two end caps and is in driving relationship through a one way clutch with an associated device such as the flywheel of an internal combustion engine. Because the end of the rotor shaft, which drives the engine shaft for starting purposes, is more highly loaded, it is the common practice to use an anti-friction bearing such as a roller or ball bearing at this end of the shaft. The other end of the shaft, which normally is more lightly loaded, is journaled in the remaining end cap by a plain bearing. In addition, the commutator is normally positioned at the end of the rotor adjacent the driving shaft end thereof. This means that the motor coil winding and the cooperating permanent magnets are spaced axially from the anti-friction bearing. This causes an increased loading on the plain bearing. Also vibrations will occur that adversely affect both bearings. This is particularly a problem because the plain bearing end of the rotor shaft is normally cantilevered. That is only the drive end of the outer housing is affixed to the associated internal combustion engine.

Thus in accordance with a first feature of the invention, the commutator and brushes are relocated from the conventional position to the end of the rotor shaft spaced from its driving end and closer to the plain bearing. This permits the coil windings and permanent magnets to be moved closer to the antifriction bearing.

The cantilevered mounting of conventional starter motors also gives rise to considerable vibrational loads and resulting stresses on the plain bearing. Thus in accordance with a further feature of the invention, the second end cap is formed with reinforcing ribs and an arrangement that permits its direct attachment to the body of the engine being started.

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ISSUES BEFORE THE BOARD

A first issue before the Board is whether the subject matter of Claims 1,10-13, 16 and 17 is obvious under 35 USC 103(a) on the combination of US Patent 5,576,588 (Moribayashi et al) in view of US Patent 5,823,047 (Hosoya).

A second issue before the Board is whether the subject matter of Claims 14,15, 18, 19, 23-26 and 30 is obvious under 35 USC 103(a) on the combination of US Patent 5,576,588 (Moribayashi et al) in view of US Patent 5,823,047 (Hosoya) as applied to claims 10 and 17 in further view of US Patent 4,897,571 (Isozumi).

A third issue before the Board is to determine if the subject matter of Claims 27-29 is obvious under 35 USC 103(a) on the combination of US Patent 5,576,588 (Moribayashi et al) in view of US Patent 5,823,047 (Hosoya) and in further view of US Patent 4,897,571 (Isozumi) as applied to claim 26 with US Patent 5,742,110 (Hefner).

A fourth issue before the Board is to determine if the subject matter of Claims 1 and 16 is obvious under 35 USC 103(a) on the combination of US Patent 5,576,588 (Moribayashi et al) in view of US Patent 4,296,343 (McMillen).

A fifth issue before the Board is to determine if the subject matter of Claims 1 and 16 is obvious under 35 USC 103(a) on the combination of US Patent 5,576,588 (Moribayashi et al) in view of US Patent 4,707,630 (Tomite et al).

A sixth issue before the Board is to determine if the subject matter of Claims 1 and 16 is obvious under 35 USC 103(a) on the combination of US Patent 4,795,932 (Long) in view of US Patent 6,089,112 (Kelly et al).

A seventh issue before the Board is to determine if the subject matter of Claims 1 and 16 is obvious under 35 USC 103(a) on the combination of US Patent 4,795,932 (Long) in view of US Patent 1,472,872 (Kindl).

GROUPING OF THE CLAIMS

The following groups of claims stand or fall together:

Claims 1 and 16

Claims 10 and 17

Claims 12 and 13

Claims 15 and 19

The patentability of each of these groups and the remaining claims will be argued separately.

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APPELLANT'S ARGUMENTS

Before going into detail to rebut each of the Examiner's seven different rejections based on eight different references, appellant's attorney would at the outset admit that, in retrospect, the invention here may appear simple. However when an Examiner, as here, bases multiple rejections on a substantial number of different basic references and a number of different secondary references, this itself seems to rebut the allegation of obviousness. It is hoped that this point will become clear to the Board from the following arguments.

A first and important feature of appellant's invention is the retention of the conventional plain and antifriction bearing support of a starter motor shaft, while improving the individual loading of each bearing by the relocation of the commutator and brushes to the area adjacent the plain bearing thus permitting the movement of the windings and permanent magnets closer to the antifriction bearing. This feature is recited in claim 1, which has been rejected by the Examiner on two different basic references Moribayashi et al and Long, neither of which, by the Examiner's own admission anticipate the claim. In fact in his first expressed rejection based on this reference the Examiner states that Moribayashi et al "show (sic) all of the limitations of the claimed invention in Figures 13, 14 and 19". If so why does he require a secondary reference in rejecting this claim on three different combinations based on this reference? Also it should be noted that Moribayashi et al himself discloses 17 different examples and the figures the Examiner has relied upon are not of all the same example.

The Examiner further rebuts his own position in this regard when he states in the same first rejection "Moribayashi et al do (sic) not use plain bearing." As stressed above, appellants invention expressed in claim 1 deals with an improvement in electric starter motors having a plain and an antifriction bearing.

For clarity reproduced below is the comparison of claim 1 with Moribayashi et al that was made to the Examiner in the amendment preceding the rejection that has been appealed.

1. (Compared) A rotating electrical machine comprised of an outer housing assembly and a rotor including a rotor shaft journaled therein, said rotor shaft having a drive portion extend outwardly beyond said outer housing assembly for driving relation with another shaft, said outer housing assembly being comprised of a stator shell closed at opposite ends thereof by first and second end caps, said first end cap providing an anti-friction bearing journaling said rotor shaft adjacent said drive portion with said drive portion extending through said first end cap, said first end cap having attachment means for providing a mounting connection to a body that journals the another shaft, said stator shell carrying a plurality of permanent magnets, said rotor having a plurality of windings cooperating with said permanent magnets, a commutator fixed to said rotor shaft at an end thereof spaced from said drive portion of said rotor shaft and in electrical communication with said rotor

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windings, fasteners for affixing said end caps to each other and to opposite ends of said stator shell, a brush carrier fixed to said stator shell and carrying brushes cooperating with said commutator, and a plain bearing carried by said second end cap for journaling the end of said rotor shaft spaced from said drive portion.

This comparison still is valid. At this point it should be mentioned that Moribayashi et al is concerned with the positioning of the permanent magnets and not the bearings. The only figure of this reference that shows the bearings in detail is Figure 19 and that embodiment or "example", as he calls it uses two antifriction bearings and thus fails completely to address the problem of dealing with structures that employ low cost plain bearings at one shaft end.

To remedy this admitted defect the Examiner turns to Hosoya in his first rejection based on Moribayashi et al. This is no help in appellant's mind. This reference shows two plain bearings for the shaft and the electric motor shaft drives the shaft of the engine being started through an external transmission and thus does not bear the direct load from that engine shaft.

In his next rejection based on Moribayashi et al as the primary reference, the Examiner again admits that this reference lacks a plain bearing. He seeks reference to McMillen to cure this defect, but again fails to make out a prima facie case. McMillen does not show a starter motor but also fails to show how the other end of the motor shaft is supported and clearly lacks the anti friction bearing and plain bearing combination. Thus it is submitted that the rejections based on this combination are fatally defective.

In his third rejection of claim 1 based on Moribayashi et al, the Examiner again rebuts his own position about the reference anticipating this feature and alleges that the defect is cured by Tomite et al. Again, however this combination fails. This time because like the combination relying on Hosoya Tomite et al uses two plain bearings because it does not have a cantilevered shaft.

Claim 1 is also rejected on two combinations that rely on Long as the basic reference. The Examiner incorrectly states that this reference shows all the features of the claim except for the end cap construction. Again this is wrong, because the Long reference does not relate to a starter motor and thus uses two plain bearings while the claim requires two different type of bearings. The two different secondary references used by the Examiner do not nor they intended to remedy this defect.

Thus it is submitted that all rejections of claim 1 should be reversed as none of them make out a prima facie case of obviousness.

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Claim 10 depends directly on claim 1 and further requires that "end caps are fixed to each other by threaded fasteners and the stator shell is sandwiched therebetween". The Examiner alleges his rejection of this claim, that is based only on the Moribayashi et al Hosoya combination that Moribayashi et al shows all of the features of this claim, but then why does he utilize a secondary reference for his combination. The Board can readily see that Moribayashi et al shows no manner of end cap connection and this rejection also should be reversed.

Claims 11-13 depend directly or indirectly on claim 10 and thus partake of its distinction over the references either alone or in combination. In addition claim 11 requires the brush carrier to be fixed to the second end cap. In Moribayashi et al figure 15 is described at column 5 lines 29 and 30 as being "integrated with the retaining portions 21." These however are fixed to the motor cylindrical shell 16.

Claims 12 and 13 depend on claim 11 and thus incorporate the distinguishing features of that claim. In addition these two claims that stand or fall together, call for the second end closure to be "affixed to a body that journals the another shaft". This being the engine being started. Again the Examiner has not discussed this feature of the claims. Undoubtedly because no reference of record shows or teaches that feature. Therefore no prima facie case of obviousness having been made, the Board is solicited to reverse the rejection of these claims.

Claim 16 has also been rejected on the Moribayashi et al, Hosoya combination. This is an independent claim, but for the purposes of this appeal stands or falls with claim 1 as it distinguishes over each of the art rejections applied to it in the same way as claim 1.

For a similar reason claim 17 stands or falls with claim 10.

Claims 14, 15 18 and 19 add a feature to the claims upon which they depend which has not yet been addressed. This is the feature that the end cap that carries the plain bearing is formed with stiffening ribs in the area around the bearing where the fasteners that fix the end caps in closing and sandwiching relation to the shell pass. These claims have been rejected only on the combination of Moribayashi et al and Hosoya in further view of Isozumi.

The Examiner states that this added reference shows "stiffening ribs 21a". Again, however, he is attempting to read appellants invention into the reference. Isozumi utilizes a resinous end bracket and utilizes a pair of metal plates 22 to spread the compressive load over a greater area. The ribs 21a are designed with the sole purpose of preventing the plates 22 from being displaced when the fasteners are being tightened (Column 4 lines 1-4). Since this reference is concerned with load distribution if the ribs 21a were to provide any strength for the bearing it would have stated this.

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Claims 15 and 19 still further distinguish in calling for this end cap to be affixed to the body of the engine being started. The patentability of this feature has been discussed in the rejection of claims 12 and 13 and that argument is incorporated herein by reference. These claims do not stand or fall with those claims because of different dependency. Claims 15 and 19, however stand or fall together.

Thus it is most respectfully submitted that the Examiner's several rejections all fail to make out a prima facie case of obviousness, in fact to the contrary emphasize appellants inventive features and reversal of all of the rejections is solicited.

Respectfully submitted:



Ernest A. Beutler
Reg. No. 19901

Phone (949) 721- 1182
Pacific Time

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APPENDIX
CLEAN COPY OF CLAIMS ON APPEAL

1. A rotating electrical machine comprised of an outer housing assembly and a rotor including a rotor shaft journaled therein, said rotor shaft having a drive portion extending outwardly beyond said outer housing assembly for driving relation with another shaft, said outer housing assembly being comprised of a stator shell closed at opposite ends thereof by first and second end caps, said first end cap providing an anti-friction bearing journaling said rotor shaft adjacent said drive portion with said drive portion extending through said first end cap, said first end cap having attachment means for providing a mounting connection to a body that journals the another shaft, said stator shell carrying a plurality of permanent magnets, said rotor having a plurality of windings cooperating with said permanent magnets, a commutator fixed to said rotor shaft at an end thereof spaced from said drive portion of said rotor shaft and in electrical communication with said rotor windings, fasteners for affixing said end caps to each other and to opposite ends of said stator shell, a brush carrier fixed to said stator shell and carrying brushes cooperating with said commutator, and a plain bearing carried by said second end cap for journaling the end of said rotor shaft spaced from said drive portion.

10. A rotating electrical machine as set forth in claim 1 wherein the end caps are fixed to each other by threaded fasteners and the stator shell is sandwiched therebetween.

11. A rotating electrical machine as set forth in claim 10 wherein the brush carrier is fixed to the second end cap.

12. A rotating electrical machine as set forth in claim 11 wherein the second end cap is affixed to a body that journals the another shaft.

13. A rotating electrical machine as set forth in claim 12 wherein the machine comprises a starter motor for starting an internal combustion engine and the another shaft comprises a shaft associated with said engine.

14. A rotating electrical machine as set forth in claim 10 wherein the second end cap is formed with stiffening ribs in the area of the plane bearing to minimize distortion loads thereon from the threaded fasteners.

15. A rotating electrical machine as set forth in claim 14 wherein the second end cap is formed with a mounting bracket that is affixed to a body that journals the another shaft and at least some of the stiffening ribs are integral with said mounting bracket.

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16. A rotating electrical machine comprised of an outer housing assembly and a rotor including a rotor shaft journaled therein, said rotor shaft having a drive portion extending outwardly beyond said outer housing assembly for driving relation with another shaft, said outer housing assembly being comprised of a stator shell closed at opposite ends thereof by first and second end caps, said first end cap providing an anti-friction bearing journaling said rotor shaft adjacent said drive portion with said drive portion extending through said first end cap, said first end cap having attachment means for providing a mounting connection to a body that journals the another shaft, said stator shell carrying a plurality of permanent magnets, said rotor having a plurality of windings cooperating with said permanent magnets, a commutator fixed to said rotor shaft in electrical communication with said rotor windings, fasteners for affixing said end caps to each other and to opposite ends of said stator shell, a brush carrier fixed to said stator shell and carrying brushes cooperating with said commutator, and a plain bearing carried by said second end cap for journaling the end of said rotor shaft spaced from said drive portion.

17. A rotating electrical machine as set forth in claim 16 wherein the end caps are fixed to each other by threaded fasteners and the stator shell is sandwiched therebetween.

18. A rotating electrical machine as set forth in claim 17 wherein the second end cap is formed with stiffening ribs in the area of the plane bearing to minimize distortion loads thereon from the threaded fasteners.

19. A rotating electrical machine as set forth in claim 18 wherein the second end cap is formed with a mounting bracket that is affixed to a body that journals the another shaft and at least some of the stiffening ribs are integral with said mounting bracket.

23. A rotating electrical machine as set forth in claim 19 wherein the brush carrier carries a number of brushes all of which are confined in an area that encompasses not greater than 180° around the rotational axis of the rotor shaft.

24. A rotating electrical machine as set forth in claim 23 wherein the brushes are confined in an area that encompasses 90° around the rotational axis of the rotor shaft.

25. A rotating electrical machine as set forth in claim 23 wherein the brush carrier carries two brushes.

26. A rotating electrical machine as set forth in claim 25 wherein four permanent magnets are fixed to the stator shell.

27. A rotating electrical machine as set forth in claim 26 wherein the permanent magnets are formed from a high magnetic density material.

28. A rotating electrical machine as set forth in claim 27 wherein the high magnetic density material comprises neodymium-iron-boron.

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29. A rotating electrical machine as set forth in claim 28 wherein the brushes are confined in an area that encompasses 90° around the rotational axis of the rotor shaft.

30. A rotating electrical machine as set forth in claim 19 wherein the machine comprises a starter motor for starting an internal combustion engine and the another shaft comprises a shaft associated with said engine.